

Effects of the spatial resolution of digital elevation model data on the performance of TOPMODEL

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Abstract Digital elevation model (DEM) resolution affects topographic characteristics such as slope, specific catchment area and topographic index. In this study, those topographic characteristics computed from 100- and 1000-m resolution DEMs were compared for 30 locations within the Hanjiang River basin in China. Most differences in the slope calculation between the 100- and 1000-m DEM can be attributed to terrain-smoothing effects. Terrain discretization and smoothing almost have the same level of effects on specific catchment area and topographic index. TOPMODEL was applied to simulate 14 flood events in the Baohe watershed and to investigate the effects of DEM resolution on hydrological modelling. The terrain-discretization and smoothing effects cause a decrease in the Nash-Sutcliffe coefficient and an increase in runoff volume and flood peak. Both the terrain-discretization and smoothing have little effect on the flood peak time and the shape of hydrographs.

Key words discretization; smoothing; effect of DEM resolution; TOPMODEL
